(19) Japan Patent Office (JP)

(11) Patent Application Kokai
No.: H6-294077

(12) Patent Official Gazette (A)

(51) Int. Cl [5]		I.D. No. Interbureau Classification No. F1	(43) Kokai (Public Disclosure) date:
D 06 N	3/14	8016 - 4F	10/21/1994
	3/18	8016 - 4F	

Number of claims: 6 (7 pages)

(21) Application No. : H5-316090

(22) Application date : Nov. 22, 1993

(31) Priority right claim No. : Application No. H5-45793
(32) Priority Date : Feb. 10, 1993
(33) Priority right claim country : Japan (JP)

(71) Applicant : 000000077
Akiresu K.K.
22- 5 Daikyo-cho, Shinjuku-ku, Tokyo

(72) Inventor : Katsumi Osawa
93, Ushizawa, Ota, Gunma-ken

(72) Inventor : Kazuo Mitsumura
2-268-14, Aioi-cho, Kiryu-shi, Gunma-ken

(72) Inventor : Kazuhiro Sugatani
1932-2, Showa-cho, Isezaki-shi, Gunma-ken

(54) [Title of the Invention]

Synthetic Leather and the Production Method for it

(57) [Summary]

[Objective]

To offer the synthetic leather that has similar feeling to the touch, wrinkles, and substantial fullness to the synthetic leather that can be obtained by the wet method, and which is of lower cost compared with the synthetic leather obtained by the wet method,

and that is very suitable when used as the material for the brief cases, bags, sandals, shoes, furniture, cars, etc., and also to offer a production method for this material.

[Structure]

Synthetic leather characterized by the fact that the surface skin layer is formed on the fiber base material in which a urethane type resin W / O type dispersion liquid was coated and / or impregnated. Method to produce the synthetic leather characterized by the fact that the surface skin layer is formed on the surface of the fiber base material after the urethane type resin W / O type dispersion liquid is coated and / or impregnated into the fiber base material. Napped knit fabric is suitable as the fiber base material. If the surface correction is done on the fiber base material in which the urethane type resin W / O type dispersion liquid is coated and / or impregnated, before forming the surface skin layer, the synthetic leather that has a smooth surface and a better feel to the touch and with wrinkles can be obtained.

[Scope of the Patent Application]

[Claim1]

Synthetic leather characterized by the fact that the surface skin layer is formed on the fiber base material in which the urethane type resin W / O type dispersion liquid was coated and / or impregnated.

[Claim 2]

Synthetic leather in which the urethane type resin W / O type dispersion liquid is a poly carbonate type urethane resin W / O type dispersion liquid, and also the surface skin layer is the poly carbonate type urethane resin layer, as was described in Claim 1.

[Claim 3]

Synthetic leather in which the surface skin layer is laminated on the fiber base material

by an adhesive agent comprised of poly carbonate type urethane resin, as was described in Claim 2.

[Claim 4]

Synthetic leather in which the fiber base material is a napped knit fabric, as was described in any one of Claim 1 to Claim 3.

[Claim 5]

Method to produce the synthetic leather characterized by the fact that the surface skin layer is formed on the surface of the fiber base material after the urethane type resin W / O type dispersion liquid was coated and / or impregnated into the fiber base material.

[Claim 6]

Method for producing the synthetic leather characterized by the fact that after the urethane type resin W / O type dispersion liquid was coated and / or impregnated into the fiber base material, the surface is re-touched by heating and pressing with a flat roll, as was described in Claim 5.

[Detailed Explanation of the Invention]

[0001]

[Field of Utilization in Industry]

This invention relates to the synthetic leather that can be used as the material for the brief cases, bags, miscellaneous goods, sandals, shoes, furniture, cars, etc., and also to the production method for this material. In particular, it relates to the synthetic leather that has as a similar feeling to the touch, wrinkles, and substantial fullness as the synthetic leather obtained by the wet method, and the production method for this material.

[0002]

[Existing Technology]

Concerning the synthetic leather made until now, the one that is produced by the so called dry method in which the skin layer comprised of a urethane resin is laminated on the surface of the fiber base material with an adhesive agent, or the one that can be produced by the so called wet method in which the urethane solution is coated and / or impregnated into the fiber base material, and then it is solidified by a non-solvent of the urethane resin (*this may be a typical Japanese abbreviation style to indicate, the solvent that does not dissolve urethane, Translator*), and a fine pore layer is formed on the surface, and the skin layer is provided, depending on necessity, have been known.

[0003]

[Problem That this Invention Intends to Solve]

The synthetic leather made by the above mentioned wet method has excellent feeling to the touch, wrinkles and also substantial fullness, however, in the wet method, the process is complicated, namely, after the urethane resin is coated and / or impregnated into the fiber base material, it is solidified with the non- solvent of urethane resin (*this is the same as above, Translator*), and the solvent is removed, and then it is dried, therefore, the process becomes a greater nuisance compared with the dry method, and as the result, the production cost is high. Compared with that, the dry method is a simple process and its workability is excellent and the cost is low too, however, the obtained synthetic leather does not have as good wrinkles and the feeling to the touch is hard, and also it lacks substantial fullness too.

[0004]

This invention was made to solve the above mentioned problems, and its objective is to offer the synthetic leather that has a similar feeling to the touch, wrinkles, and substantial fullness to those of the synthetic leather that can be obtained by the existing

wet method, and also of which the production process is simple and of low cost.

[0005]

[Method to Solve the Problem]

The synthetic leather of this invention is characterized by the fact that the surface layer is provided after the urethane type resin W / O type dispersion liquid is coated and / or impregnated into the fiber base material. Also, the production method of synthetic leather of this invention is characterized by the fact that the skin layer is formed on the surface of the fiber base material after the urethane type resin W / O type dispersion liquid is coated and / or impregnated into the fiber base material.

[0006]

The base material that can be used for this invention is not particularly limited as long as it is the knitted cloth, woven cloth, etc., that has been used for the existing synthetic leathers. It can be comprised of synthetic fibers such as poly ester, poly amide, poly acrylonitrile, etc., the natural fibers such as cotton, linen, etc., regenerated fibers such as rayon, acetate, staple fiber, etc., alone or mixed spun fibers of these as well. However, in order to obtain a softer feeling, better feeling to the touch, better wrinkles, and substantial fullness, the knitted fabric of which at least the side on which the urethane type resin W / O type dispersed liquid is going to be coated, is napped, should be used preferably.

[0007]

In this invention, the urethane type resin W / O type dispersed liquid that is impregnated and / or coated into the above mentioned fiber base material, is such where the urethane type resin solution in which various additives such as the coloring agent, filler, a light stabilizer, a UV absorber, an oxidation preventer, etc., are added, depending on

necessity, is dispersed in a solvent such as methyl ethyl ketone (MEK), toluene, di-methyl formamide (DMF), etc. Also in this invention, the urethane type resin means the urethane type elastic resin that can be obtained by reacting an organic di-isocyanate, a long chain diol and a low molecular weight chain extending agent. Concerning the film properties of the above mentioned urethane type resin, the one of which the 100 % modulus is 10 to 50 kg / cm^2 is preferred. When the 100 % modulus is less than 10 kg / cm^2, the peeling strength, which is the physical property that is necessary for the material of briefcases, bags, miscellaneous goods, sandals, shoes, furniture, cars, etc., become poor although the feeling to the touch becomes soft. Also, if the 100 % modulus exceeds 50 kg / cm^2, the feeling to the touch becomes hard.

[0008]

As the organic di-isocyanate, to be concrete, the aromatic di-isocyanates such as 4, 4'-di-phenyl methane di-isocyanate, naphthalene di-isocyanate, tolylene di-isocyanate, xylylene di-isocyanate, etc., or the aliphatic or alicyclic di-isocyanates such as butylene di-isocyanate, hexa methylene di-isocyanate, 4, 4'- di-cyclo hexyl methane di-isocyanate, cyclo hexane di-isocyanate, methyl cyclo hexane di-isocyanate, etc., can be listed.

[0009]

As the long chain diol, poly ether type diols such as poly tetra methylene glycol, poly propylene glycol, poly ethylene glycol, etc., aliphatic poly carbonate type diols such as poly ethylene carbonate, poly butylene carbonate, poly hexa methylene carbonate, etc., aliphatic poly ester type diols such as poly ethylene adipate, poly hexa methylene adipate, etc., and poly capro lactone diol, etc., can be listed.

[0010]

As the low molecular weight chain extending agent, to be concrete, aliphatic diols such

as ethylene glycol, butylene glycol, hexa methylene glycol, etc., alicyclic diols such as cyclo hexane diol, etc., aromatic diols such as xylylene glycol, etc., diamines such as ethylene diamine, propylene diamine, hexa methylene diamine, etc., and hydrazine derivatives such as hydrazine, hydrazide, amino acid hydrazide, etc., can be listed.

[0011]

In the case when the synthetic leather of this invention is utilized for an application that especially requires abrasion resistance strength such as in furniture or car seat materials, etc., it is preferred to use the poly carbonate type urethane resin among the above mentioned urethane type resins. The above mentioned poly carbonate type urethane resin can be obtained by reacting an aliphatic poly carbonate type diol such as poly ethylene carbonate, poly butylene carbonate, poly hexa methylene carbonate, etc., and an organic di-isocyanate and a low molecular weight chain extending agent.

[0012]

In the above mentioned urethane type resin W / O type dispersion liquid, there is the no pore type and multi- pore type, and either one can be used in this invention, however, in the case when the synthetic leather of this invention is utilized in an application that especially requires strength in abrasion resistance such as the furniture or car seat materials, etc., it is preferred to use the no pore type.

[0013]

The resin that is used as the surface skin layer is normally the urethane resin that is comprised of the above mentioned composition, however, in some cases, macro molecular polymers such as natural rubber, chloroprene, SBR, acrylic type resin, silicone type resin, vinyl chloride type resin, etc., can be co-used too. In the case when the synthetic leather of this invention is utilized in an application that especially requires strength in abrasion resistance such as the furniture or car seat materials, etc., it is

preferred to use the poly carbonate type urethane resin among the above mentioned urethane type resins the same as the urethane type resin W / O type dispersion liquid. The film properties of the urethane type resin that is used, should be preferably such that the 100 % modulus is 50 to 150 kg / cm^2.

[0014]

If necessary, the synthetic leather of this invention can have a middle layer comprised of urethane type resin, etc., or a surface treated layer, and in addition, embossing work or rubbing work can be applied too.

[0015]

Concerning the preferred method for producing the synthetic leather of this invention, first, the urethane type resin W / O type dispersion liquid is coated and impregnated into the above mentioned fiber base material by an already known method such as a knife coater, "comma doctor?" (*phonetically written*), a roll coater, a reverse coater, a rotary screen coater, etc. The amount of the urethane type resin W / O type dispersion liquid attached at this time, should be 3 to 50 wt % of the fiber base material, and preferably it should be 5 to 30 wt %. If the attached amount of the urethane type resin W / O type dispersion liquid is less than 3 wt % of the fiber base material, the wrinkles will be the same as those in the synthetic leather obtained by the existing dry method, and the wrinkles that can be obtained by the wet method can not be obtained. When the attached amount of the urethane type resin W / O type dispersion liquid exceeds 50 wt % of the fiber base material, the feeling to the touch becomes hard.

[0016]

Obtaining the synthetic leather is not limited to the method in which the urethane type resin W / O type dispersion liquid is coated on the fiber base material by the above

mentioned method, and it can be obtained by submerging the fiber base material into the urethane type resin W / O type dispersion liquid as well, however, when such method is used, the process becomes not very different from the wet method, therefore, as was mentioned above, it is preferred to use the method of coating the urethane type resin W / O type dispersion liquid.

[0017]

The fiber base material on which the urethane type resin W / O type dispersion liquid was coated or impregnated, is dried in an oven, etc. Concerning the temperature at that time, it is acceptable to maintain a constant temperature too, however, if a temperature gradient is used from a low temperature to a high temperature, the feeling to the touch of the obtained synthetic leather becomes even softer and that is preferred.

[0018]

If necessary, in the fiber base material on which the urethane type resin W / O type dispersion liquid was coated or impregnated that was obtained in the above mentioned manner, surface modification can also be done by heating and pressing with a flat roller to smooth the ups and downs generated due to the partial pulling by the napped part. Concerning the method used at this time, it should be heated to the temperature that is 20 ^{o}C lower than the softening temperature of the urethane type resin that was impregnated, and it should be pressed with a pressure of 3 to 9 kg / cm^2 by a flat roll. The change in the thickness after the heating and pressing at this time, should be 5 to 20 %. Thus, when the surface modificaton is performed, not only does the surface becomes smoother, but also the adhering of the fiber base material and surface skin layer becomes better, and the abrasion resistance improves, and also, if the fiber base material is a napped type, the density of the napped part increases, and fine micro wrinkles will be created and the synthetic leather with wrinkles that are extremely similar to those in natural leather can be obtained.

[0019]

The surface skin layer is formed on the fiber base material on which the urethane type resin was coated or impregnated that was obtained in the above mentioned manner. Concerning the method for forming the surface skin layer, the so called transcription method in which a solution of urethane resin, etc., is coated on a release paper with a texture pattern by an already known method such as a knife coater, a "Comma doctor?", a roll coater, a reverse coater, a rotary screen coater, etc., and it is dried and gelled, and the obtained surface skin layer is laminated on the surface of the fiber base material by an adhesive agent, or the method in which it is coated directly on the surface of the fiber base material by the above mentioned means, can be applied.

[0020]

In the case when the synthetic leather of this invention is utilized in an application that especially requires strength in abrasion resistance such as the furniture or car seat materials, etc., and also the surface skin layer is formed by an adhesive agent, it is preferred to use the one that is comprised of poly carbonate type urethane resin and also of which the 100 % modulus is 50 to 150 kg / cm^2.

[0021]

[Operation]

Since the synthetic leather of this invention is made by laminating the surface skin layer on the fiber base material on which the urethane type resin W / O type dispersion liquid was coated or impregnated, in spite of the fact that it was obtained by a simple production process, the same as the dry method, the obtained synthetic leather has the soft feel that is equal to that of the material obtained by the wet method, and it has good wrinkles and substantial fullness, so that it is suitable to be used as the material for the brief cases, bags, sandals, shoes, furniture, cars, etc. In addition, the production

method of the synthetic leather of this invention is completely similar to that of the existing dry method and it is simple except that urethane type resin W / O type dispersion liquid is coated on the fiber base material, therefore, the synthetic leather that has the same soft feeling to the touch as the synthetic leather obtained by the wet method, and also which has good wrinkles and substantial fullness can be offered at lower cost.

[0022]

[Actual Examples]

Next, this invention will be explained in further detail, referring to actual examples.

[0023]

[Actual Example 1]

Poly ester fibers and rayon fibers were mix- spun, and this was woven diagonally, and one side of this cloth, of which the thickness was 0.75 mm, was napped. On this one-side- napped- cloth, a 10 % solution of W / O type dispersion liquid of poly ether type fine pore type poly urethane of which the 100 % modulus was 35 kg / cm^2 and which was comprised of the blend indicated in Table 1, was coated in the way that the coated amount became 25 g / m^2 (9 wt % of the fiber base material) as the solid portion of poly urethane, and thereafter, it was dried at 70 °C for 2 minutes and then at 120 °C for 2 minutes, and thus the fiber base material was obtained. The obtained fiber base material had a thickness of 0.85 mm, and the napped part had a sponge structure with uniform and fine air holes, and it had excellent softness.

[Table 1]

Hairemunon X -3040 (NV 30 %) (made by Dainichi Seika Kogyo K.K.)	100 weight parts

Methyl ethyl ketone	60 weight parts
Toluene	60 weight parts
Water	80 weight parts

[0024]

A 21 % DMF - MEK solution (included 20 weight parts of coloring agent) of a poly ester type poly urethane of which the 100 % modulus was 80 kg / cm^2 was coated on a release paper with a texture pattern by a knife coater to make the dried thickness become 25 μm, and it was hot- air- dried in an oven at 90 °C for 2 minutes, and the surface skin layer was obtained.

[0025]

As the adhesive agent- forming- coating- liquid, a 50 % MEK- toluene solution of the 2-liquid type poly ester type poly urethane of which the 100 % modulus was 25 kg / cm^2 was coated on the surface skin layer by a knife coater to make the dried thickness become 55 μm, and after it was hot- air- dried in an oven at 90 °C for 1.5 minutes, the coated surface of the above mentioned fiber base material on which the poly urethane type resin W / O type dispersion liquid was coated, was pasted on the said adhesive agent layer, and they were laminated into one body, and it was heated to 60 °C for 48 hours and it was cured, and thereafter the release paper was peeled off, and the synthetic leather of this invention was obtained. The obtained synthetic leather was evaluated for its feel, wrinkles, substantial fullness, planar smoothness, and surface wear, by the below listed standards. The results are shown in Table 6.

[0026] < Evaluation Standards >

(A) Feeling to the touch

❍ ..... The feeling to the touch was soft, the same as the synthetic leather obtained by the wet method.

Δ .... The feeling to the touch was slightly inferior to that of the synthetic leather obtained by the wet method, but it was still soft.

x ..... The feeling to the touch was hard.

(B) Wrinkles

❍ ..... The wrinkles were as small as those on the synthetic leather obtained by the wet method.

Δ .... Slightly larger wrinkles compared with those on the synthetic leather obtained by the wet method.

x ..... The wrinkles were larger compared with those on the synthetic leather obtained by the wet method.

(C) Substantial fullness feeling

❍ .... It was the same as the synthetic leather obtained by the wet method.

Δ .... It is slightly inferior to the synthetic leather obtained by the wet method.

x ..... Inferior.

(D) Smoothness of the surface

❍ .... The ups and downs on the fiber base material could almost not be seen.

Δ .... The ups and downs on the fiber base material could be seen slightly.

x ..... The ups and downs on the fiber base material were obvious.

(E) Surface wear..... Evaluation using the Taber abrasion test (Wheel H-22, load of 1 kg, 1000 rotation)

❍ ..... There were no abnormalities recognized on the surface.

Δ ..... There were slight abnormalities recognized on the surface.

x ..... Extreme abnormalities were recognized on the surface.

[0027]

[Actual Example 2]

A 12 % solution of W / O type dispersion liquid of poly ether non- pore type poly urethane of which the 100 % modulus was 20 kg / cm^2 and which was comprised of the blend indicated in Table 2, was coated by a knife coater on the napped surface of a 0.9 mm thick tricot napped cloth made out of poly ester fiber, in the way that the coated amount became 36 g / m^2 (13 wt % of the fiber base material) as the solid portion of poly urethane, and thereafter, it was dried at 70 °C in an oven for 2.5 minutes and then at 120 °C for 1.5 minutes, and thus the fiber base material was obtained.

[Table 2]

Hairemunon Y - 229 (NV 30 %) (made by Dainichi Seika Kogyo K.K.)	100 weight parts
Methyl ethyl ketone	80 weight parts
Water	70 weight parts

[0028]

A 23 % DMF - toluene solution (included 5 weight parts of a coloring agent) of the non-yellowing type poly carbonate type poly urethane elastomer of which the 100 % modulus was 90 kg / cm^2 was coated on the release paper with a texture pattern by a knife coater to make the dried thickness become 10 μm, and it was hot- air- dried in an oven at 90 °C for 1.5 minutes, and the surface skin layer was obtained.

[0029]

As the middle layer- forming- coating- liquid, a 21 % DMF- MEK solution (included 20 weight parts of a coloring agent) of poly ether type poly urethane of which the 100 % modulus was 40 kg / cm^2 was coated on the surface skin layer by a knife coater to make the dried thickness become 25 μm, and it was hot- air- dried in an oven at 90 °C

for 2 minutes, and thus, the middle layer was formed.

[0030]

In addition, as the adhesive agent- forming- coating- liquid, a 50 % DMF- toluene solution of a 2- liquid type poly ether type poly urethane of which the 100 % modulus was 35 kg / cm^2 was coated on the middle layer by a knife coater to make the dried thickness become 60 μm, and after it was hot- air- dried in an oven at 90 °C for 2 minutes, the coated surface of the above mentioned fiber base material on which the poly urethane type resin W / O type dispersion liquid was coated, was pasted on the said adhesive agent layer, and they were laminated into a single body, and it was heated to 60 °C for 48 hours and it was cured, and thereafter the release paper was peeled off, and the synthetic leather of this invention was obtained. The obtained synthetic leather was evaluated for its characteristics the same as that in Actual Example 1. The results are shown in Table 6.

[0031]

[Actual Example 3]

The synthetic leather was obtained by the same procedure that was used in Actual Example 1, except that the coated amount of 10 % solution of W / O type dispersion liquid of poly ether type fine pore type poly urethane was changed to 10 g / m^2 (3.5 wt % of the fiber base material). The characteristics of the obtained synthetic leather were evaluated the same as in Actual Example 1. The results are shown in Table 6.

[0032]

[Actual Example 4]

The synthetic leather was obtained by the same procedure that was used in Actual Example 1, except that the coated amount of 10 % solution of W / O type dispersion liquid of poly ether type fine pore type poly urethane was changed to 7 g / m^2 (2.5 wt %

of the fiber base material). The characteristics of the obtained synthetic leather were evaluated the same as in Actual Example 1. The results are shown in Table 6.

[0033]

[Actual Example 5]

The synthetic leather was obtained by the same procedure that was used in Actual Example 1, except that the coated amount of 10 % solution of W / O type dispersion liquid of poly ether type fine pore type poly urethane was changed to 125 g / m^2 (45 wt % of the fiber base material). The characteristics of the obtained synthetic leather were evaluated the same as in Actual Example 1. The results are shown in Table 6.

[0034]

[Actual Example 6]

The synthetic leather was obtained by the same procedure that was used in Actual Example 1, except that the coated amount of 10 % solution of W / O type dispersion liquid of poly ether type fine pore type poly urethane was changed to 150 g / m^2 (54 wt % of the fiber base material). The characteristics of the obtained synthetic leather were evaluated same as in Actual Example 1. The results are shown in Table 6.

[0035]

[Actual Example 7]

The synthetic leather was obtained by the same procedure that was used in Actual Example 1, except that the fiber base material was changed to one which was not napped. The characteristics of the obtained synthetic leather were evaluated the same as in Actual Example 1. The results are shown in Table 6.

[0036]

[Actual Example 8]

Poly ester fiber and rayon fiber were mix- spun, and then this was woven diagonally, and one side of this cloth of which the thickness was 0.7 mm, was napped. On this one- side- napped- cloth, a 12 % solution of W / O type dispersion liquid of poly carbonate no pore type poly urethane which was comprised of the blend indicated in Table 3, was coated by a knife coater in the way that the coated amount became 40 g / m^2 (16 wt % of the fiber base material) as the solid portion of the poly urethane, and thereafter, it was dried in an oven at 70 °C for 2 minutes and then at 120 °C for 2 minutes, and thus the fiber base material was obtained.

[Table 3]

Hairemunon Y - 249 (NV 30 %) (made by Dainichi Seika Kogyo K.K.)	100 weight parts
Methyl ethyl ketone	29 weight parts
Toluene	17 weight parts
Di- methyl form amide	4 weight parts
Water	100 weight parts

[0037]

A 23 % DMF - toluene solution (included 15 weight parts of a coloring agent) of a non-yellowing type poly carbonate type poly urethane elastomer of which the 100 % modulus was 90 kg / cm^2 was coated on the release paper with a texture pattern by a knife coater to make the dried thickness become 20 μm, and it was hot- air- dried in an oven at 90 °C for 2 minutes, and the surface skin layer was obtained.

[0038]

As the middle layer- forming- coating- liquid, a 20 % DMF- MEK solution (included 20 weight parts of a coloring agent) of poly carbonate type poly urethane of which the 100 % modulus was 50 kg / cm^2 was coated on the surface skin layer by a knife coater to make the dried thickness become 25 μm, and it was hot- air- dried in an oven at 90 °C for 2 minutes, and thus, the middle layer was formed.

[0039]

In addition, as the adhesive agent- forming- coating- liquid, a 50 % DMF- toluene solution of a 2- liquid type poly carbonate type poly urethane of which the 100 % modulus was 25 kg / cm^2 was coated on the middle layer by a knife coater to make the dried thickness become 60 μm, and after it was hot- air- dried in an oven at 90 °C for 2 minutes, the coated surface of the above mentioned fiber base material on which the poly urethane type resin W / O type dispersion liquid was coated, was pasted onto the said adhesive agent layer, and they were laminated into a single body, and it was heated to 60 °C for 48 hours and it was cured, and thereafter the release paper was peeled off, and the synthetic leather of this invention was obtained. The characteristics of the obtained synthetic leather were evaluated the same as in Actual Example 1. The results are shown in Table 6.

[0040]

[Actual Example 9]

Poly ester fibers and rayon fibers were mix- spun, and then it was woven diagonally, and one side of this cloth of which the thickness was 0.7 mm, was napped. On this one- side- napped- cloth, a 10 % solution of W / O type dispersion liquid of poly carbonate no pore type poly urethane of which the 100 % modulus was 25 kg / cm^2 that was comprised of the blend indicated in Table 4, was coated by a knife coater in the way that the coated amount became 40 g / m^2 (16 wt % of the fiber base material) as the solid portion of poly urethane, and thereafter, it was dried in an oven at 80 °C for

1.5 minutes and then at 120 °C for 2 minutes, and thus the fiber base material with a thickness of 0.85 mm, was obtained.

[Table 4]

Hairemunon Y - 249 (NV 30 %) (made by Dainichi Seika Kogyo K.K.)	100 weight parts
Methyl ethyl ketone	58 weight parts
Toluene	34 weight parts
Di- methyl formamide	8 weight parts
Water	100 weight parts

[0041]

The surface of the obtained fiber base material was modified by a flat embossing roll (at a temperature of 140 °C, and a pressure of 5.5 kg / cm^2) and it was made into a fiber base material with a thickness of 0.75 mm.

[0042]

A 21 % DMF - toluene solution (included 20 weight parts of a coloring agent) of the non-yellowing type poly carbonate type poly urethane resin of which the 100 % modulus was 90 kg / cm^2 was coated on the release paper with a texture pattern by a knife coater to make the dried thickness become 20 μm, and it was hot- air- dried in an oven at 90 °C for 2 minutes, and the surface skin layer was obtained.

[0043]

As the middle layer - forming- coating- liquid, a 23 % DMF- MEK solution (included 20 weight parts of a coloring agent) of a nearly non- yellowing- type poly carbonate type poly urethane of which the 100 % modulus was 50 kg / cm^2 was coated on the surface skin layer by a knife coater to make the dried thickness become 20 μm, and it was hot-air- dried in an oven at 90 °C for 2 minutes, and thus, the middle layer was formed.

[0044]

In addition, as the adhesive agent- forming- coating- liquid, a 50 % DMF- toluene solution of a 2- liquid type poly carbonate type poly urethane of which the 100 % modulus was 25 kg / cm^2 was coated on the middle layer by a knife coater to make the dried thickness become 55 μm, and after it was hot- air- dried in an oven at 90 °C for 2 minutes, the coated surface of the above mentioned fiber base material on which the poly urethane type resin W / O type dispersion liquid was coated, was pasted on the said adhesive agent layer, and they were laminated into a single body, and it was heated to 60 °C for 48 hours and it was cured, and thereafter the release paper was peeled off, and the synthetic leather of this invention was obtained. The characteristics of the obtained synthetic leather were evaluated the same as in Actual Example 1. The results are shown in Table 6.

[0045]

[Actual Example 10]

Poly ester fibers and rayon fibers were mix- spun, and it was woven diagonally, and both sides of this cloth, of which the thickness was 1.1 mm, were napped. On the rough napped surface of this cloth, a 12 % solution of W / O type dispersion liquid of poly carbonate type no pore type poly urethane of which the 100 % modulus was 25 kg / cm^2 which was comprised of the blend indicated in Table 5, was coated by a knife coater in the way that the coated amount became 30 g / m^2 (10.5 wt % of the fiber base material) as the solid portion of poly urethane, and thereafter, it was dried in an oven at 80 °C for 1.5 minutes and then at 120 °C for 2 minutes, and thus the fiber base material with a thickness of 1.2 mm, was obtained.

[Table 5]

Hairemunon Y - 249 (NV 30 %) (made by Dainichi Seika Kogyo K.K.)	100 weight parts

Methyl ethyl ketone	40 weight parts
Toluene	25 weight parts
Di- methyl form amide	5 weight parts
Water	80 weight parts

[0046]

The surface of the obtained fiber base material was modified by a flat embossing roll (temperature of 135 °C, and a pressure of 6 kg / cm^2) that was Teflon coated, and it was made into a 1.0 mm thick fiber base material.

[0047]

A 23 % DMF - toluene solution (included 15 weight parts of a coloring agent) of a non-yellowing type poly carbonate type poly urethane resin of which the 100 % modulus was 60 kg / cm^2 was coated on the release paper with a calf texture pattern by a knife coater to make the dried thickness become 25 μm, and it was hot- air- dried in an oven at 90 °C for 2.5 minutes, and the surface skin layer was obtained.

[0048]

As the middle layer- forming- coating- liquid, a 23 % DMF- MEK solution (included 15 weight parts of a coloring agent) of a nearly non- yellowing- type poly carbonate type poly urethane of which the 100 % modulus was 50 kg / cm^2 was coated on the surface skin layer by a knife coater to make the dried thickness become 20 μm, and it was hot-air- dried in an oven at 90 °C for 2 minutes, and thus, the middle layer was formed.

[0049]

In addition, as the adhesive agent- forming- coating- liquid, a 50 % DMF- toluene solution of the 2- liquid type poly carbonate type poly urethane of which the 100 % modulus was 25 kg / cm^2 was coated on the middle layer by a knife coater to make the dried thickness become 50 μm, and after it was hot- air- dried in an oven at 90 °C for 2

minutes, the coated surface of the above mentioned fiber base material on which the poly urethane type resin W / O type dispersion liquid was coated, was pasted on the said adhesive agent layer, and they were laminated into a single body, and it was heated to 60 °C for 48 hours and it was cured, and thereafter the release paper was peeled off, and the synthetic leather of this invention was obtained. The characteristics of the obtained synthetic leather were evaluated the same as in Actual Example 1. The results are shown in Table 6.

[0050]

[Comparison Example1]

Synthetic leather was obtained by the same procedure that was used in Actual Example 1, except that the urethane resin to be coated on the fiber base material was changed to the solvent type. The characteristics of the obtained synthetic leather were evaluated the same as in Actual Example 1. The results are shown in Table 6.

[0051]

[Comparison Example 2]

Synthetic leather was obtained by the same procedure that was used in Actual Example 2, except that the urethane resin to be coated on the fiber base material was changed to the solvent type. The characteristics of the obtained synthetic leather were evaluated the same as in Actual Example 1. The results are shown in Table 6.

[0052]

[Table 6]

	E 1	E 2	E 3	E 4	E 5	E 6	E 7	E 8	E 9	E 10	C 1	C 2
Feeling to the touch	○	○	○	○	○	Δ	Δ	○	○	○	x	x
Wrinkles	Δ	○	Δ	Δ	○	○	Δ	○	○	○	x	x
Substantial fullness	○	○	○	Δ	○	○	○	○	○	○	x	x

Surface smoothness	x	Δ	x	x	x	x	Δ	Δ	○	○	x	Δ
Surface wear ability	x	Δ	x	x	x	x	x	Δ	○	○	x	Δ

E means Actual Example.
C means Comparison Example.

[0053]

The synthetic leather of this invention has a soft feel that is equal to the level of that of the synthetic leather obtained by the wet method, and it has good wrinkles and substantial fullness. In addition, it is of low cost, and it can be suitably used as the material for brief cases, bags, sandals, shoes, furniture, cars, etc. In addition, the synthetic leather of this invention can be surface- treated or rubbing- worked the same as the existing synthetic leather, so it is possible to do further value- adding- processing.

[0054]

Also, the production method of the synthetic leather of this invention is very similar to that of the existing simple dry method except that the urethane type resin W / O type dispersion liquid is coated on the fiber base material, therefore, the synthetic leather which has the same soft feeling to the touch as the synthetic leather obtained by the wet method, and also which has good wrinkles and substantial fullness can be offered at low cost by using the same level of facility as the existing dry method.

[0055]

Further, when the surface modification work is done by a flat roll on the fiber base material on which the urethane type resin W / O type dispersion liquid was coated or impregnated, the synthetic leather of which the surface is smooth and which has fine wrinkles and which is more similar to the natural leather, can be obtained.